

--1. (Amended) A method comprising:

transmitting a sound wave comprised of a first portion and a second portion, the first portion comprising a pulse signal and the second portion comprising a ring-down signal;

obtaining a characteristic of the second portion;

storing the characteristic;

using the characteristic to detect an echo of another sound wave; and

repeating transmitting, obtaining, storing and using periodically for different sound waves and corresponding first and second portions.

2. (Amended) The method of claim 1, wherein the ring-down signal comprises a signal that decays in amplitude over time.

20. (Amended) A method comprising:

transmitting a signal;

receiving a first echo in response to the signal; and

receiving a second echo in response to the signal;

wherein if an amplitude of the first echo exceeds a corresponding amplitude of the second echo, then the second echo is determined to be a multipath error from a single object; and

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wherein if an amplitude of the second echo exceeds a corresponding amplitude of the first echo, then the first and second echoes are determined to be from first and second objects, respectively, and the method further comprises:

using the first echo to determine information relating to the first object; and

using the second echo to determine information relating to the second object.

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25. (Amended) A method comprising:

transmitting a waveform having a predetermined shape;

receiving a signal;

analyzing a shape of the signal; and

determining if the signal comprises an echo of the waveform based on analysis of the shape of the signal and the waveform having the predetermined shape.

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28. (Amended) A pulse-echo sonar scanner for a mobile robot, comprising:

a transmitter which generates a pulse signal;

an acoustic transducer which transmits and receives acoustic signals;

a receiver;

means for determining performance characteristics of the transducer periodically during operation of the pulse-echo sonar scanner for a given pulse, the performance characteristics of the transducer comprising transducer ring-down;
means for storing the performance characteristics; and

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Conced. means for determining threshold levels for an echo signal based on the stored performance characteristics.

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33. (Amended) A method of adjusting threshold levels on a mobile robot scanner, comprising:

measuring ring-down characteristics of the mobile robot scanner periodically during operation of the mobile robot scanner;
creating a dynamic threshold level based on the ring-down characteristics; and applying the dynamic threshold levels to received signals.

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35. (Amended) An apparatus comprising:
a transducer which transmits a sound wave comprised of a first portion and a second portion, the first portion comprising a pulse signal and the second portion comprising a ring-down signal; and

a processor which obtains a characteristic of the second portion, stores the characteristic, uses the characteristic to detect an echo of another sound wave, and repeats obtaining, storing, and using periodically for different sound waves and corresponding first and second portions.

36. (Amended) The apparatus of claim 35, wherein the ring-down signal comprises a signal that decays in amplitude over time.

54. (Amended) An apparatus comprising:

a transducer which transmits a signal;
and
a receiver which receives a first echo and a second echo in response to the signal;
a processor which compares amplitudes of the first and second echoes;
wherein if an amplitude of the first echo exceeds a corresponding amplitude of the second echo, then the processor determines that the second echo is a multipath error from a single object; and
wherein if an amplitude of the second echo exceeds a corresponding amplitude of the first echo, then the processor determines that the first and second echoes are from first and second objects, respectively, and the processor:
uses the first echo to determine information relating to the first object; and
uses the second echo to determine information relating to the second object.

59. (Amended) An apparatus comprising:

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a transducer which transmits a waveform having a predetermined shape;
a receiver which receives a signal; and
a processor which analyzes a shape of the signal, and determines if the signal comprises an echo of the waveform based on analysis of the shape of the signal and the waveform having the predetermined shape.

62. (Amended) A computer program stored on a computer-readable medium, the computer program comprising instructions that cause a processor to:

obtaining a characteristic of a second portion of a sound wave comprised of a first portion and a second portion, the first portion comprising a pulse signal and the second portion comprising a ring-down signal;

store the characteristic;

use the characteristic to detect an echo of another sound wave; and

repeat transmitting, obtaining, storing and using periodically for different sound waves and corresponding first and second portions.

63. (Amended) The computer program of claim 62, wherein the ring-down signal comprises a signal that decays in amplitude over time.

81. (Amended) A computer program stored on a computer-readable medium, the computer program comprising instructions that cause a processor to:

cause a signal to be transmitted;

receive a first echo in response to the signal; and

receive a second echo in response to the signal;

wherein if an amplitude of the first echo exceeds a corresponding amplitude of the second echo, then the second echo is determined to be a multipath error from a single object; and

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wherein if an amplitude of the second echo exceeds a corresponding amplitude of the first echo, then the first and second echoes are determined to be from first and second objects, respectively, and the computer program provides for:

using the first echo to determine information relating to the first object; and
using the second echo to determine information relating to the second object.

86. (Amended) A computer program stored on a computer-readable medium, the computer program comprising instructions that cause a processor to:

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cause a waveform having a predetermined shape to be transmitted;
receive a signal;
analyze a shape of the signal; and
determine if the signal comprises an echo of the waveform based on analysis of the shape of the signal and the waveform having the predetermined shape.--